B2 Cont Sub C

7. (Amended) The flexible interconnect substrate as defined in claim 6, wherein the low-bending-resistance portions are disposed on two edge portion sides of the base substrate, symmetrically with respect to the center in the widthwise direction of the base substrate.

8. (Amended) The flexible interconnect substrate as defined in claim 6, wherein the low-bending-resistance portions are disposed on two edge portion sides of the base substrate, asymmetrically with respect to the center in the widthwise direction of the base substrate.

REMARKS

Claims 1-24 are pending herein. Claims 8, 9, 11, 12, 14, 15, 17, 18, 20 and 21 are withdrawn from consideration by way of an election of species requirement. Thus, claims 1-7, 10, 13, 16, 19 and 22-24 have been examined.

By this Amendment, claims 1-3 and 6-8 have been amended. In particular, claim 1 has been amended to recite that the second region includes low-bending-resistance portions that are formed in regions that exclude and sandwich a central portion of the second region in the widthwise direction of the base substrate in order to more clearly structurally distinguish the second region of the base substrate of the claimed interconnect substrate from the structures described in each of the three references cited in the outstanding Office Action. No new matter is added by this Amendment, support for the amendment to claim 1 being supported in the original specification at least at, for example, the original drawing figures and page 15, lines 17-22.

The attached Appendix includes marked-up copies of each rewritten claim (37 C.F.R. §1.121(c)(1)(ii)).

I. Election of Species Requirement

Upon allowance of a generic claim, Applicant notes that the election of species requirement should be withdrawn and all pending claims allowed as not constituting more than a reasonable number of species within the generic class.

II. Objection to the Title

The title was objected to as allegedly not being descriptive. By this Amendment, the title has been amended to be more descriptive of the invention. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

III. Rejections Under 35 U.S.C. §102(b)

A. Relying Upon Kunio

Claims 1-7, 10, 16, 19 and 22-24 were rejected under 35 U.S.C. §102(b) as allegedly being anticipated by JP-A 4-162440 (hereinafter Kunio). This rejection is respectfully traversed.

By way of background, the present invention relates to a flexible interconnect substrate comprising a tape-shaped base substrate and an interconnect pattern formed on the base substrate, wherein the base substrate includes (a) a first region in which a predetermined interconnect pattern has been formed and which will form a unit when separated from the base substrate, and (b) a second region positioned next to the first region in the longitudinal direction of the base substrate. The second region has low-bending-resistance portions which are formed in regions that exclude and sandwich a central portion of the second region in the widthwise direction of the base substrate to ensure that the second region bends more readily in the direction in which the longitudinal axis of the base substrate bends, in comparison with the first region. See claim 1.

As explained throughout the present specification, this invention ensures that a region (the second region) that is designed to bend more readily is provided adjacent to a region (the

first region) that is to be punched out. Thus, when the flexible interconnect substrate is bent, stresses concentrate in the second region, and thus stress concentrations in the first region are avoided. This suppresses any bending of the interconnect pattern within the first region. See, for example, page 2, lines 17-24 and page 14, lines 6-19.

Kunio describes a mounting structure and a mounting method of a tape carrier. As described in the Abstract and shown in the Figures, a metallic foil pattern 5 is formed onto a base material film 1 adjacent wiring groups 2 and a tape T is adhered onto the base material film 1 through the metallic foil pattern 5. When a tape carrier is mounted, the wiring groups 2 are punched by cut lines L at every unit, and the terminals of each wiring group are bonded with members to be connected, with each wiring group 2 being fastened firmly onto the base material film 1 through the metallic foil patterns by the tape T. The base material film 1 is described to be introduced continuously to an OLB process under the state of the fixed tape, and the tape T for fixing is cut in the slit holes 4 and bonded, thus permitting continuous operation of the process.

Kunio differs from the presently claimed flexible interconnect substrate at least in that Kunio fails to teach or suggest a base substrate having a first region in which a predetermined interconnect pattern is formed and a second region positioned next to the first region in the longitudinal direction of the base substrate, and in which the second region has low-bending-resistance portions formed in regions that exclude and sandwich a central portion of the second region in the widthwise direction of the base substrate, thereby ensuring that the second region bends more readily in the direction in which the longitudinal axis of the base substrate bends in comparison with the first region. Kunio simply describes the inclusion of a metallic foil pattern 5 and slit holes 4 on each side of the metallic foil pattern 5 in the longitudinal direction of the base material film 1, the metallic foil pattern 5 and slit holes 4 being isolated to a small region on one widthwise side of the base material film 1. Kunio

does not teach or suggest that the metallic foil pattern 5 or slit holes 4 associated therewith exclude a central portion of the second region and also sandwich such central portion of the second region as recited in claim 1 of the present application. In other words, Kunio does not teach or suggest a plurality of such patterns 5 and slit holes 4 in a second region positioned in such a manner as to exclude and sandwich a central portion of the second region as in claim 1.

As such, the metallic foil pattern 5 and slit holes 4 described in Kunio would not ensure that the second region bends more readily in the direction in which the longitudinal axis of the base substrate bends, in comparison with the first region, in the manner achieved in the flexible interconnect substrate of claim 1.

Kunio thus fails to teach or suggest each and every limitation recited in present claim 1. Accordingly, reconsideration and withdrawal of the rejection under 35 U.S.C. §102(b) relying upon the teachings of Kunio are respectfully requested.

B. Relying Upon Hirotaka

Claims 1-7, 10-16, 19 and 22-24 were rejected under 35 U.S.C. §102(b) as allegedly being anticipated by JP-A 5-121486 (hereinafter Hirotaka). This rejection is respectfully reversed.

Hirotaka describes a TAB type semiconductor device and an apparatus for manufacturing the same in which peeling or damage of electrically connecting parts of inner leads to a semiconductor pallet is prevented by partly aiding a bending property of an insulating film. In particular, as described in the Abstract and shown in the Figures, Hirotaka describes including a bending property aiding means 18a in an insulating film 18 of a TAB type semiconductor 17a.

In the Office Action, it was alleged that Hirotaka described low-bending-resistance portions 20a in a region between regions of the substrate including the interconnect patterns.

However, Applicant emphasizes that the portions 20a in the TAB type semiconductor device of Hirotaka do not anticipate the invention as presently defined in claim 1.

In particular, the portions 20a in the TAB type semiconductor device of Hirotaka are described and shown to be a single through-hole extending symmetrically across nearly the entire width of the substrate. In describing a single through-hole extending nearly the entire width of the substrate, the device of Hirotaka fails to teach or suggest a flexible interconnect substrate in which a second region, positioned next to a first region in which the predetermined interconnect pattern is formed, has low-bending-resistance portions that are formed in regions that exclude and sandwich a central portion of the second region in the widthwise direction of the base substrate as recited in present claim 1. Thus, the design of Hirotaka merely describes a single through-hole that neither excludes nor sandwiches a central portion of the second region in the widthwise direction of the base substrate.

As such, the design of Hirotaka would not ensure that the second region bends more readily in the direction in which the longitudinal axis of the base substrate bends, in comparison with the first region, in the same manner as the flexible interconnect substrate of present claim 1.

For at least the foregoing reasons, Applicant respectfully submits that Hirotaka also fails to anticipate the presently claimed flexible interconnect substrate. Reconsideration and withdrawal of this rejection are respectfully requested.

C. Relying Upon Hutchison

Claims 1-7, 10 and 13 were rejected under 35 U.S.C. §102(b) as allegedly being anticipated by U.S. Patent No. 4,132,856 (hereinafter Hutchison). This rejection is respectfully traversed.

Hutchison describes a process of forming a plastic encapsulated molded film carrier package and a package formed by such process. See the Abstract. As shown in Figures 2

and 4 of Hutchison, the film carrier 12 includes a number of apertures therein, and particularly a pair of relatively long, rectangular apertures 48 and a pair of relatively short apertures 50, with both pairs of apertures 48 and 50 bordering rectangular film aperture 52, all of these apertures defining relatively narrow web segments 54 within wider end segments 56, all of these segments supporting leads 14. See column 5, lines 32-46.

Further, as described at column 6, lines 11-22, in order to electrically isolate the leads from one another for a continuity test, the wider webs 56 are through-punched in a configuration shown as 58 (in phantom in Figure 2 and as dash punched in Figure 4). The slot 58 is a single through-hole extending nearly the entire width of the film carrier 12.

Thus, the design of the film carrier of Hutchison including the through-punched slot 58 is very similar to the design of the device of Hirotaka discussed immediately above. That is, like Hirotaka, the slot 58 in Hutchison is a single through-hole extending nearly the entire width of the film carrier. As such, for all the same reasons discussed above with respect to Hirotaka, Hutchison also fails to teach or suggest a second region of a base substrate of a flexible interconnect substrate that has low-bending-resistance portions formed in regions that exclude and sandwich a central portion of the second region in the widthwise direction of the base substrate. Thus, again similar to Hirotaka discussed above, the film carrier of Hutchison would not ensure that the second region bends more readily in the direction in which the longitudinal axis of the base substrate bends, in comparison with the first region, in a manner similar to the invention of claim 1.

Finally, it must be emphasized that one of ordinary skill in the art would not have found the present invention obvious from Hutchison. Hutchison requires a single through-hole extending the nearly the entire width of the film carrier in order to electrically isolate the leads from one another for a continuity test. If one were to alter the design of the through-hole described in Hutchison, for example so that the through-hole was separated into a

plurality of holes excluding and sandwiching a central portion of this region of the film carrier, the leads would then no longer all be electrically isolated from each other as required for the continuity test described in Hutchison. In requiring a single through-hole across nearly the entire width of the film carrier in order to electrically isolate the leads from one another for a continuity test, Hutchison would have led one of ordinary skill in the art away from the presently claimed invention.

For at least the foregoing reasons, Applicant respectfully submits that Hutchison fails to teach or suggest each and every limitation of present claim 1. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

IV. Rejection Under 35 U.S.C. §103(a)

Claims 16, 19 and 22-24 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Hutchison. This rejection is respectfully traversed.

As to this ground of rejection, the Patent Office merely cited MPEP section 2113. Applicant respectfully submits that mere reference to a section of the MPEP does not provide sufficient reasoning to support a proper prima facie case of obviousness, much less provide Applicant with sufficient notice of the grounds of the rejection such that a reasonable response could be made thereto.

However, Applicant submits that in view of the deficiencies of Hutchison discussed extensively above, nothing in Hutchison would have suggested the additional embodiments recited in claims 16, 19 and 22-24 of the present application. In particular, as discussed above, Hutchison would have led one of ordinary skill in the art away from the presently claimed invention recited in claim 1, and thus similarly would have led one of ordinary skill in the art away from the additional embodiments recited in these claims referencing claim 1.

For at least the foregoing reasons, Applicant respectfully submits that Hutchison would not have led one of ordinary skill in the art to the invention recited in these claims. Reconsideration and withdrawal of this rejection are respectfully requested.

V. Conclusion

In view of the foregoing amendments and remarks, Applicant respectfully submits that claims 1-24 are in condition for allowance. Should the Examiner believe that anything further is necessary in order to place the application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

James A. Oliff
Registration No. 27,075

Joel S. Armstrong
Registration No. 36,430

Christopher W. Brown
Registration No. 38,025

JAO:JSA:CWB/rxg

Attachment:
Appendix

Date: October 8, 2002

OLIFF & BERRIDGE, PLC
P.O. Box 19928
Alexandria, Virginia 22320
Telephone: (703) 836-6400

DEPOSIT ACCOUNT USE AUTHORIZATION
Please grant any extension necessary for entry;
Charge any fee due to our Deposit Account No. 15-0461

APPENDIX

Changes to Title:

The following is a marked-up version of the amended title:

A FLEXIBLE INTERCONNECT SUBSTRATE~~, FILM CARRIER,~~ OF A TAPE-SHAPED SEMICONDUCTOR DEVICE, SEMICONDUCTOR DEVICE AND CIRCUIT BOARD, AND METHOD OF MAKING SAME~~MANUFACTURING THE SAME, CIRCUIT BOARD, AND ELECTRONIC EQUIPMENT~~

Changes to Claims:

The following is a marked-up version of the amended claims 1-3 and 6-8:

1. (Amended) A flexible interconnect substrate comprising:

a tape-shaped base substrate; and

an interconnect pattern formed on the base substrate,

wherein the base substrate includes:

a first region in which a predetermined interconnect pattern has been formed and which will form a unit when separated from the base substrate; and

a second region positioned next to the first region in the longitudinal direction of the base substrate; and

wherein the second region has ~~a~~ low-bending-resistance portions which ~~is~~ are formed in ~~a~~ regions that excludes and sandwich a central portion of the second region in the widthwise direction of the base substrate, for ensuring that the second region bends more readily in the direction in which the longitudinal axis of the base substrate bends, in comparison with the first region.

2. (Amended) The flexible interconnect substrate as defined in claim 1, wherein each of the low-bending-resistance portions is one of through-holes, cuts, and a thinner portion.

3. (Amended) The flexible interconnect substrate as defined in claim 1, wherein a high-bending-resistance portion is formed in each of the first region and the central portion of the second region in the widthwise direction of the base substrate;

wherein the high-bending-resistance portion is formed to avoid ~~a~~ regions that excludes the central portion of the second region in the widthwise direction of the base substrate; and

wherein the regions avoided by the high-bending-resistance portion relatively forms ~~a relatively~~ the low-bending-resistance portions.

6. (Amended) The flexible interconnect substrate as defined in claim 1, wherein ~~a plurality of~~ the low-bending-resistance portions are formed in a straight line within the second region, across the width of the base substrate.

7. (Amended) The flexible interconnect substrate as defined in claim 6, wherein the ~~plurality of~~ low-bending-resistance portions are disposed on two edge portion sides of the base substrate, symmetrically with respect to the center in the widthwise direction of the base substrate.

8. (Amended) The flexible interconnect substrate as defined in claim 6, wherein the ~~plurality of~~ low-bending-resistance portions are disposed on two edge portion sides of the base substrate, asymmetrically with respect to the center in the widthwise direction of the base substrate.